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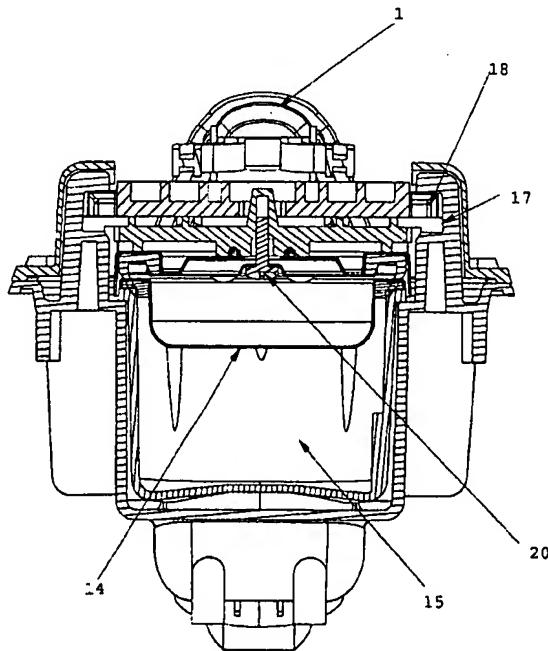
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### (54) Locking device sustaining high pressure for coffee maker lid

(57) This invention provides a locking device sustaining high pressure in a coffee maker which comprises a brew head assembly which comprises: a slide assembly, a sealing assembly and a pop-up and roll-back assembly, operatively linked to sustain pressure up to four (4) bars. Furthermore, this invention provides a method for one-hand operation on the locking of a coffee maker comprising steps of: a) using one hand to pull a lever (1) forward to release a lock which is controlled by two

parts, the slider (3) and the three mounts (17) on the brew head base (16), wherein the back-and-forth movement of the slider will produce the action of locking and releasing the brew head assembly; b) moving the lever forward; a push rod (2) assembled on the slider will push the slider forward and release the brew head; or pushing the lever back will push back the slider and lock the brew head; and c) after releasing the lock, the lift platform (10) will pop up assisted by the lift platform spring (11) and the lid mount roll up assisted by the hinge spring (13).

Figure 1



**Description**

[0001] This application claims priority of U.S. Patent Application No. 10/616,417, filed July 9, 2003, the contents of which are incorporated herein in its entirety by reference.

[0002] Throughout this application, various publications are referenced. Disclosures of these publications in their entireties are hereby incorporated by reference into this application to more fully describe the state of the art to which this invention pertains.

**BACKGROUND OF THE INVENTION**

[0003] This invention relates to the locking mechanism of a coffee maker using coffee pods.

[0004] The original drip-type coffee maker using ground coffee does not create any pressure and thus does not need a locking mechanism to prevent leaking. The pump espresso and automatic espresso coffee machines need a locking mechanism with more than five (5) bar back pressure to prevent leaking.

[0005] A coffee maker using coffee pods normally creates one (1) to three point five (3.5) bar pressure on the machine. Thus, a locking mechanism that is used in espresso machines with more than five (5) pressure bars is not necessary. Instead, a locking mechanism that tolerates a back pressure of up to four (4) bars is needed for the coffee maker using coffee pods.

[0006] The existing pump espresso and automatic espresso machines use an aluminum filter cup and flat silicone ring for sealing to achieve the level of tightness and closeness needed to tolerate more than five (5) pressure bars. In the known art, the operation requires that the locking mechanism be turned in a horizontal direction.

[0007] Fischer (U.S. Patent No. 5,794,519) describes an espresso machine having an upper head part which is only pivotable relative to a lower brewing head part. The brew head assembly of the present invention contains a lid mount which when opened or unlocked will move upward and rotate/pivot backward, relative to the brew head base, to allow easy access to the coffee filter by the operator.

[0008] The advantage of this invention is that the mechanism requires less force to use and is easier to operate. The pop-up and roll-back brew head is designed to let the brew head rise up automatically. In addition, this invention facilitates the operator's use of only one hand to lock and release the brew head.

**SUMMARY OF THE INVENTION**

[0009] In accordance with these and other objects of the invention, a brief summary of the present invention is presented. Some simplifications and omission may be made in the following summary, which is intended to highlight and introduce some aspects of the present in-

vention, but not to limit its scope. Detailed descriptions of a preferred exemplary embodiment adequate to allow those of ordinary skill in the art to make and use the invention concepts will follow in later sections.

[0010] The brew head assembly of a coffee maker can be considered as three main parts: a slide assembly, a sealing assembly, and a pop-up and a roll-back assembly.

[0011] The slide assembly is made up of a lever, push rod, a slider part, a slider spring, and a lid mount. These parts are assembled together after molding.

[0012] The sealing assembly is made up of an "O" ring, a water spreader top, a seal ring, a water spreader bottom, a metal pod filter, a coffee collector, and a brew head bottom. These parts are assembled together.

[0013] The pop-up and roll-back assembly is made up of a lift platform, a lift platform spring, hinge pins, a hinge spring, and a brew head base. These parts are assembled together.

[0014] The invention is designed to be used as follows: the brew head assembly is normally closed on the machine. Before brewing coffee, a coffee pod should be placed in the metal pod filter. To release the lock on the brew head, the operator needs only use one hand to push the lever forward.

[0015] The lock is controlled by two parts: the three legs of the slider and the three mounts on the brew head base. The forward and backward movements of the slider will produce the locking and releasing actions. When the lever is pushed forward, the push rod that is assembled on the slider will push the slider forward so that the brew head is released. When the lever is pulled back, the push rod will put back the slider so that the brew head is locked.

[0016] After the lock is released, the lift platform spring will cause the lift platform to pop up. The hinge spring rolls up the lid mount.

[0017] The seal function depends on the seal ring. The special shape of the seal ring can bear one (1) to four (4) bar pressure. During the brewing cycle, the back pressure on the pod will raise the sealing assembly a little bit. The small gap allows the two flaps on the seal ring to extend slightly. This extension of the flap end can improve the sealing. This little rise up of the seal ring helps to better adjust the thickness of brewed coffee.

**DETAILED DESCRIPTION OF THE FIGURES**

[0018] The accompanying drawing illustrates diagrammatically non-limitative embodiment of the invention. One embodiment of the invention is shown in Figure 1 to Figure 6.

[0019] The invention relates to a brew head of a coffee maker having a locking mechanism which can be operated using one-hand and which can sustain one (1) to four (4) bar back pressure. The concept of this invention is shown in Figure 1 to Figure 6.

[0020] Figure 1 is a cross-sectional illustration of the

brew head assembly of the present invention.

[0021] Figure 2 is an exploded view of the sliding assembly and the pop-up and roll-back assembly of the present invention.

[0022] Figure 3 is an exploded view of the sealing assembly of the present invention.

[0023] Figure 4 is a side view of brew head and locking mechanism of the present invention in the latched position. The locking mechanism and brew head can be un-latched using one hand by pulling the lever 1 in the direction of arrow 19.

[0024] Figure 5 is a side view of the brew head and locking mechanism of the present invention illustrating the pop-up action of the lid mount and the lift platform.

[0025] Figure 6 is a side view of brew head and locking mechanism of the present invention illustrating the roll-back action of the lid mount.

[0026] The present invention will be described in connection with a preferred embodiment, however, it will be understood that this is no intent to limit the invention to the embodiment described. On the contrary, the intent is to cover all alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

#### DETAILED DESCRIPTION OF THE INVENTION

[0027] This invention provides a brew head assembly of a coffee maker comprising: a slide assembly, a sealing assembly, and a pop-up and roll-back assembly, operatively linked to sustain pressure up to four (4) bars. In an embodiment, the slide assembly comprises a lever, push rod, slider part, slider spring, and a lid mount.

[0028] In another embodiment, the sealing assembly comprises an "O" ring, a water spreader top, a seal ring, a water spreader bottom, a metal pod filter, a coffee collector, and a brew head bottom. In a further embodiment, the shape of the seal ring is round with a two-flap end capable of withstanding pressure up to four (4) bars. In a further embodiment, the seal ring is made of silicone rubber.

[0029] In a further embodiment, the coffee pod/coffee inside the metal pod filter creates a back pressure for a little rise up of the sealing assembly. In a further embodiment, the pop-up and roll-back assembly comprises a lift platform, a lift platform spring, a hinge pins, a hinge spring, and a brew head base. In a further embodiment, the lift platform comprises at least two legs for pop-up action. In a further embodiment, the roll up or pivot of the lid mount is assisted by a hinge spring.

[0030] In a further embodiment, the slide assembly comprises: a lever; a slider operatively linked to the lever by a push rod; and a slider spring, wherein the lever, the slider, the push rod and the slider spring are operatively fixed on a lid mount. In a further embodiment, the slider is made of aluminum or other suitable material capable of providing sturdy support.

[0031] In a further embodiment, the sealing assembly

comprises: an "O" ring, a water spreader top; a seal ring; a water spreader bottom; a metal pod filter; and a coffee collector. In a further embodiment, the seal ring is made of silicone rubber or other suitable material capable of preventing leaks at pressure of up to four (4) bars.

[0032] In a further embodiment, the pop-up and roll-back assembly comprises: a lift platform having at least two legs operatively moveably attached to a brew head base, wherein a lift platform spring is placed on at least one leg of the lift platform; and a hinge pin which operatively links a hinge spring and the slide assembly to the lift platform.

[0033] This invention provides a method for one-hand operation of a locking device of a coffee maker comprising: using one hand to pull a lever forward to release a lock which is controlled by a slider and three mounts on a brew head base, wherein the back-and-forth movement of the slider will produce an action of locking or releasing a brew head; moving the lever forward, a push rod assembled on the slider will push the slider forward and release the brew head, or pushing the lever back will push back the slider and lock the brew head; and releasing the brew head, wherein a lift platform will move upward, assisted by a lift platform spring, and a lid mount will roll-up, assisted by a hinge spring. In an embodiment, the slider comprises at least three legs. In another embodiment, the counter side holes for locking are located on the brew head base.

[0034] The brewing head assembly of the present invention comprises a slide assembly, a sealing assembly and a pop-up and roll-back assembly, all operatively linked to sustain pressure of up to four (4) bars. The slide assembly of further comprises a lever operatively linked to a slider by a push rod, and slider spring, all operatively fixed on the lid mount. When the lever is pushed back, the slider will move, and the three legs (bulging tabs) on the slider will fit into the holes of the mount on the brew head base. The brewing head assembly can be opened by pulling the lever, preferably with one hand, and the lid mount will automatically pop-up and roll-back by and through the respectively upward and rotating/uncoiling actions of the lift platform spring and the hinge spring. The sealing assembly comprises an "O" ring; a water spreader top; a seal ring; a water spreader bottom; a metal pod filter; and a coffee collector. The "O" ring is used to prevent the leaking of water between the water spreader top and the lid mount. When the lid mount and brew head base are in the close position, the water spreader top and the water spreader bottom are pressed against seal ring to prevent fluids from leaking. The pop-up and roll-back assembly comprises a lift platform having at least two legs operatively moveably attached to a brew head base, wherein a lift platform spring is placed on at least one leg of the lift platform; and a hinge pin which operatively links a hinge spring and the slide assembly to the lift platform.

[0035] The sealing assembly of the brew head assembly of the present invention is mounted beneath the

lid mount and is comprised of an "O" ring, water spreader top, water spreader bottom, radial seal ring, metal pod filter and coffee collector. The "O" ring is used to prevent leaks between the water spreader top and the lid mount. The radial seal ring, the upper rim of the metal pod filter, and the top rim of the coffee collector are used to provide sealing between the lid mount and the brew head base. The sealing assembly is secured/locked or held in place by pushing the lid mount downward, and then pushing the lever backward or inward, which causes the three legs on the slider to engage the corresponding holes/recess on the brew head base. The three legs on the slider and the corresponding holes/recesses on the brew head base creates a three point lock to provide sealing between the lid mount and the brew head base with the sealing assembly.

### Examples

**[0036]** For a general understanding of the present invention, reference is made to the drawings.

**[0037]** The locking mechanism of the brew head assembly of the present invention is designed for one-hand operation and tolerates up to four (4) pressure bars. The locking mechanism is mainly used on the pod-type machine and the spoon-brewer machine. Other types of coffee machines which can use the one-hand operable locking mechanism of the present invention include but are not limited to drip-type, filter-type and single-cup coffee makers. To prevent water from leaking, a silicone rubber seal ring is used on the brew head. The silicone rubber seal is fixed in between the water spreader top and water spreader bottom. The operation of the locking mechanism is as follows: When the lever is pushed back and the slider moves, three legs on the slider will fit the holes on the brew head bottom. The fitting will keep the seal ring pressed down to the metal pod filter. At this stage, the brew cycle can be started, and the back pressure above the pod will make the slider rise up slightly. The special shape of the seal ring will make for better sealing. As the brewing is done, the user may use one hand to pull the lever. The slider will move forward or outward and release the lock. The brew head will pop up and roll back. Opening and closing the brew head is thus made easy.

**[0038]** Figure 2 is the exploded view showing the components of the slider assembly and the pop-up and roll-back assembly. As shown, lever 1 is pulled out for un-latching. The push rod 2 links the slider 3 and the lever 1. The slider is made of aluminum material to render sturdier support. The slider spring 4 is used to prevent the lever 1 fall back in un-latch stage. Parts 1 to 4 are fixed on the lid mount 5. Parts 1 to 5 make up the slider assembly.

The other parts are for the pop-up and roll-back action. Brew head base 16 is the base which links the whole assembly. Lift platform 10 is the part that links the slider assembly to the brew head base 16. The hinge pin 12

is to fix the hinge spring 13 and the slider assembly to the lift platform. The lift platform 10 is also made of aluminum to provide stronger support. The lift platform spring 11 is placed on the two legs of the lift platform 10 to make the pop-up action. The hinge spring 13 is used for the roll-back action.

**[0039]** Figure 3 is the sealing assembly. From the Figure 1, it can be seen that the sealing assembly are mounted on the under side of the lid mount 5. This "O" ring 6 is used to prevent the leaking of water between the water spreader top 7 and the lid mount 5. The water spreader top 7 and the water spreader bottom 9 are to press the seal ring 8 and are mounted on the lid mount 5 by screw 20. The round with two flaps on upper and lower seal rings 8 is for the sealing on the brew head. The material of seal ring 8 is silicone rubber. The metal pod filter 14 is used for the placing of the coffee pod. The upper rim is to help sealing. The coffee collector 15 is for the brewed coffee, which flows to the outside through a spout below which the cup is placed. The top rim on the coffee collector 15 is also for sealing.

**[0040]** This invention provides a brew head assembly of a coffee maker comprising: a slide assembly, a sealing assembly and a pop up and roll-back assembly, all operatively linked to sustain pressure of up to four (4) bars.

**[0041]** This invention provides a slide assembly comprising a lever, push rod, a slider part, a slider spring, and a lid mount. In an embodiment, the slide assembly is as set forth in Figure 2.

**[0042]** This invention provides a sealing assembly comprising an "O" ring, a water spreader top, a seal ring, a water spreader bottom, a metal pod filter, a coffee collector, and a brew head bottom. In an embodiment, the sealing assembly is set forth in Figure 3.

**[0043]** The shape of the seal ring may be round with a two-flap end. The materials include but are not limited to silicone rubber. Other materials may be used provided that they are capable of withstanding pressure up to four (4) bars.

**[0044]** The coffee pod inside the metal pod filter creates the back pressure for a little rise-up in the sealing assembly.

**[0045]** This invention provides a pop-up and roll-back assembly comprising a lift platform, a lift platform spring, a hinge pins, a hinge spring and a brew head base. In an embodiment, the pop-up and roll-back assembly is set forth in Figure 1.

**[0046]** This invention provides a lift platform comprising at least two legs for pop-up action. In an embodiment, the roll up of a lid mount is by the hinge spring.

**[0047]** In an embodiment, the slider comprises at least three legs 18.

**[0048]** In another embodiment, the counter side holes 17 for locking are on the brew head base 16.

## Claims

1. A brew head assembly of a coffee maker comprising: a slide assembly, a sealing assembly, and a pop-up and roll-back assembly, operatively linked to sustain pressure up to four (4) bars. 5
2. The brew head of claim 1, wherein the slide assembly comprises a lever, slider part, push rod, slider spring, and a lid frame; or wherein the sealing assembly comprises an "O" ring, a water spreader top, a seal ring, a water spreader bottom, a metal pod filter, a coffee collector, and a brew head base; or wherein the pop-up and roll-back assembly comprises a lift platform, a lift platform spring, a hinge pins, a hinge spring, and a brew head base; or wherein the slide assembly comprises:
  - a) a lever; 20
  - b) a slider operatively linked to the lever by a push rod; and
  - c) a slider spring, wherein the lever, the slider, the push rod and the slider spring are operatively fixed on a lid mount. 25
3. The brew head of claim 2, wherein the shape of the seal ring is round with a two-flap end capable of withstanding pressure up to four (4) bars; or wherein the metal pod filter creates a back pressure for a little rise up of the sealing assembly; or wherein the lift platform comprises at least two legs for pop-up action; or wherein the roll up of the lid mount is by the hinge spring; or wherein the slider is made of aluminum or other suitable material capable of providing sturdy support. 30 35 40
4. The sealing assembly of claim 3, wherein the seal ring is made of silicone rubber.
5. The brew head of claim 1, wherein the sealing assembly comprises:
  - a) an "O" ring
  - b) a water spreader top; 50
  - c) a seal ring;
  - d) a water spreader bottom;
  - e) a metal pod filter; and
  - f) a coffee collector. 55

6. The sealing assembly of claim 5, wherein the seal ring is made of silicone rubber or other suitable material capable of preventing leaks at pressure of up to four (4) bars. 5

7. The brew head of claim 1, wherein the pop-up and roll-back assembly comprises:
 

- a) a lift platform having at least two legs operatively moveably attached to a brew head base, wherein a lift platform spring is placed on at least one leg of the lift platform; and
- b) a hinge pin which operatively links a hinge spring and the slide assembly to the lift platform. 15

8. A machine comprising the brew head assembly of any one of claims 1-7.

9. A method for one-hand operation of a locking device of a coffee maker comprising steps of:
 

- a) using one hand to pull a lever forward to release a lock which is controlled by a slider and three mounts on a brew base, wherein the back-and-forth movement of the slider will produce an action of locking or releasing a brew head;
- b) moving the lever forward, a push rod assembled on the slider will push the slider forward and release the brew head; or pushing the lever back will push back the slider and lock the brew head; and
- c) releasing the brew head, wherein a lift platform will move upward, assisted by a lift platform spring, and a lid mount will roll-up assisted by a hinge spring. 20 25 30 35

10. The method of claim 9, wherein the slider comprises at least three legs; or wherein the counter side holes for locking are on the brew head base. 45